Tuesday.—Reports and papers on pure and more chemical physics. Technical chemistry in B.

Wednesday.—Arrears and papers on minor or semi-technical experimental details. Simultaneous sub-section, if necessary, for clearing off arrears without haste.

It may be felt that this means a hard week's work. Well, it does. Attendance at these meetings, if attentive, is no child's play. But if any diminution is necessary, I submit that it is better to shorten each day's sitting than to lessen the number of days. One is fresh enough at 10, when the committee work begins, but pretty tired and hungry at 3. If interest dwindles, and papers begin to hurry themselves off without discussion, or to drone themselves dismally through, it is far better for the Section to rise at 2, instead of constraining itself to continue the process till the allotted hour. On the other hand, if interesting discussions arise, and attendance is good, it is very well to be able to continue the sitting till 3 or even longer. Though, indeed, Thursday is the only day on which a sitting may happily be continued beyond 3 without being disturbed by a committee meeting.

I have now said my say. I offer no apology for treating the subject, because my single aim in doing so has been to endeavour to do something to promote the usefulness and success of these meetings. OLIVER LODGE

University College, Liverpool, September 13

The Geological Age of the North Atlantic Ocean

WHILE the interest attaching to Sir William Dawson's Presidential address at Birmingham is still fresh, I wish to be allowed to offer a few observations on that part of it which deals with the geological age of the North Atlantic Ocean. The President in referring to those writers who, like Mr. Crosby in America, Mr. Mellard Reade and myself in Britain, maintain that the North Atlantic and the American continent have in the main changed places in Palæozoic times, makes the following statement. Admitting the correctness of the facts as to the swelling out of the Palæozoic sediments in the direction of the Atlantic seaboard, he endeavours to account for these very striking phenomena thus: "I prefer, with Hall, to consider these belts of sediment as in the main the deposits of northern currents, and derived from Arctic land, and that, like the great banks of the American coast at the present day, which are being built up by the present Arctic current, they had little to do with any direct drainage from the adjacent shore." Now, in reading this passage it occurs to me that Sir W. Dawson must have felt he had a very questionable case when he attempted to support it by such an hypothesis. To liken the great sheets of sediment which spread themselves sometimes over half the North American continent south of the Great Lakes to the banks heaped up along the Atlantic coast is a point of analogy in which, probably, he will find few to concur. The Palæozoic sediments are certainly not banks, but sheets originally spread over the sea-bed, and distributed according to certain recognised laws of increase and decrease of thickness.

But, putting this point aside, I may be allowed to ask, How can we suppose the existence of a northern current bringing sediment from the Arctic regions, and spreading it over Eastern America, unless there was at the same time a coast-line to guide the current in taking a southerly direction; and if such a coast-line existed, must it not have lain along the eastern American shore, because the American continent itself was then submerged? If we examine a current-chart of the globe, we find that all the N.-S. oceanic currents flow along the continental shores and take their directions from them. If America and the Atlantic, south of the Arctic regions, were both oceanic in Palæozoic times, then the current would not have been southerly, but westerly or easterly, according to circumstances, certainly not flowing from north to south; therefore this explanation for the distribution of the Palæozoic strata cannot, I venture to say, bear the test of examination.

Again, the President states: "It is further obvious that the ordinary reasoning respecting the necessity of continental areas in the present ocean basins would actually oblige us to suppose that the whole of the oceans and continents had repeatedly changed places." Now, as regards the North Atlantic, this is an objection which is purely imaginary; because the evidence goes to show that it remained in the condition of a continent all through the Palæozoic ages, with, of course, ever-varying margins; and it is only so far (as a writer in the *Athenæum*, September 4, has properly pointed out) that I have argued in favour of its continental condition. But undoubtedly the arguments in favour of the interchange of ocean and continent during Palæozoic times, as applicable to North America, would be found to apply more or less strictly to other oceans and continents, owing to the wide distribution of the formations of this period over the present continental areas. Northern and Central Africa and Greenland may prove exceptions; but apart from these tracts, Palæozoic strata appear to have been distributed (prior to denudation) over by far the greater portions of the continents, and the sediments must have been derived from the adjoining continental areas, which are now covered by the waters of the ocean.

The question between the President and myself is mainly this: Did the sedimentary strata of the Palæozoic period of North America come from lands lying around the Arctic Circle, or from others occupying the position of the North Atlantic? American geologists have a favourite theory that the Arctic regions have been the originating lands, but I venture to repeat that if it be allowed as a general principle that the originating lands lay in the direction towards which the sediments thicken, and opposite to that in which the limestones are most developed, the conclusion is inevitable that the Atlantic was in the main a land-surface in Palæozoic times. All the Palæozoic formations of North America point to this conclusion, as I have on former occasions attempted to show,[1] and this, regardless of the question whether or not there was also land along the Arctic Circle. Throughout the Silurian, Devonian, and Carboniferous epochs marine limestones were in course of formation mainly over the regions west of the Mississippi, and sediments mainly east of that line and chiefly in the Appalachian region. The general direction of the swelling out of the sediment is (if I mistake not) rather south of east than north of east. Thus, the "Potsdam beds" appear to swell out towards the E.S.E.; the "Hudson beds," S.E., and S.S.E.; the "Hamilton beds" of the Devonian, towards the E. or E.S.E.; and different members of the Carboniferous series swell out N.E., E., and S.E. On the whole, and as a general result, the centre from which the sediments appear to have been chiefly distributed seems to have lain around the point intersected by the parallel 30° N. lat. and the meridian of 60° W. long., except in the Carboniferous period, when the originating lands appear to have lain in the region of the first Atlantic cable, between Newfoundland and the British Isles, and which lands were probably continuous with those of the Arctic continent.

I wish, in conclusion, to take this opportunity of adding a few words in reference to the Archæan rocks. I am much disposed to concur in the view of Sir W. Dawson—that the fundamental gneissose beds of the Archæan period may have had a different origin from the metamorphic strata of succeeding periods, and that they may not have been originally sediments. This observation does not, however, apply to the schists, limestones, and quartzites which succeed them, and which sometimes include beds of gneiss, as in Scandinavia. From this point of view, the birthday of the Atlantic continent may not have dated farther back than the commencement of the Palæozoic age—represented in Britain by the Cambrian, and in America by the Potsdam, sandstone. As a continent it remained till the close of that age. To what extent it survived the terrestrial movements which closed that epoch I am not prepared to say.

Dublin, September 15 EDWARD HULL

Earthquake at Sea

CAPTAIN H. J. OLSEN, commanding the brig *Wilhelmine* of Drammen, reports that, on the 1st inst., being by dead reckoning in lat. 50° 10′ N., long. 1° 40′ W., he observed, between 3.30 and 4 p.m., three rumblings at short intervals, during which the ship was felt to tremble violently, so that both the bulwarks of the cabin and plates on the table clattered. The wind was north-west, with a gentle breeze, and the ship was on the starboard tack. H. MOHN

Det Norske Meteorologiske Institut,
Christiania, September 15

Peripatus

NATURE for July 29 (p. 288) mentions that *Peripatus* has been taken at Demerara. It may interest some of the readers of

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[1] *Scient. Trans.* Roy. Dublin Soc., vol. iii. 2 ser. p. 305 (1885), and "Contributions to the Physical History of the British Isles," p. 27 *et seq.*

NATURE to know that in January 1881 I captured a single specimen of *Peripatus* in the low, damp woods at Breves, on the island of Marajó, mouth of the Amazon. The specimen is now in the entomological collections of Cornell University, Ithaca, N.Y. JOHN C. BRANNER

Bloomington, Ind., U.S.A., September 2

THE RECENT EARTHQUAKE IN GREECE

I FORWARD the inclosed copy of a report made by the master of the steamship *La Valette* in reference to the earthquake which occurred in Greece last month, in case you may not have received the report and might wish to publish it.

W. J. L. WHARTON, Hydrographer

Admiralty, September 20

Report made by the Master of the s.s. "La Valette" to the Superintendent of the Ports, Malta, furnishing certain particulars in connection with the earthquake which occurred on August 27

On the 27th inst., at 11.30 p.m., whilst in lat. 36° 18′ N. and in long. 21° 32′ E., or at a distance of 50 miles W. ½ S. from Cape Matapan, I felt, all of a sudden, a very strong shock, which made the ship tremble, especially the engines, for the space of about 11 seconds. The ship was proceeding at the rate of 10 knots an hour, and with such shaking lost her course. The engineer thought that the screw had been lost. After the shaking was over all was right again. At midnight in the direction west-north-west, in lat. 36° 17′ N., long. 21° 27′ E., I observed on our right something like a mass of thick black smoke, which, like a cone, was rising up perpendicularly from the horizon, and at intervals changing into a reddish colour. In the meanwhile a perfect calm prevailed, with heavy sea from west at intervals. At 4 a.m. of the 28th, when the ship was in lat. 36° 12′ N., and in long. 20° 43′ E., the wind commenced blowing from north-west, which made the horizon a little clear. At 10 a.m. the mate, who was on watch on the bridge, reported to me that he had observed in the sea several stripes of a dark yellowish colour about one quarter of a mile long in the direction from north to south, which looked like shallows. The sea continued always heavy from west with very little wind. As the ship had a cargo of cattle, which suffer greatly from heat, I could not lose time in measuring the depth of the aforesaid stripes; therefore I tried to avoid them. During the navigation I thought proper to take precautions, as when I was at Alexandretta my owners informed me by telegraph of the report made by Capt. Tomlinson, of the steamer *Transition*. (Signed) CAPT. L. AQUILINA

Malta, August 29, 1886

THE TOTAL SOLAR ECLIPSE OF 1886

WE suppose that if, some months ago now, when the question of sending out an Expedition to Grenada during the rainy season was first discussed, any one had prophesied that out of a party of eight seven would see the eclipse and record results, the general feeling would have been that such a view would have been too sanguine. This, however, is what has happened, and so far as the securing of observations and photographs goes the Expedition must be pronounced a success.

With regard to the total result, however, no one is yet in a position to speak with certainty, for some of the photographs taken are not yet developed, and others, though developed, have not been submitted to any examination. On this point, however, we need not lay any great stress, for such photographs, though invaluable as records, do not help yet so much as such pictures will certainly be made to do hereafter in the matter of solar theory, for the reason that they are not large enough and not detailed enough.

Has, then, solar theory been advanced by the eye observations? From the sketch of the work done which appeared in yesterday's *Times*, from the pen of a Correspondent in Grenada, and which we reproduce, we think it has certainly. Prof. Tacchini's observation that the prominences seen most prominently during the eclipse were not the prominences seen by the ordinary method, and that the latter only reveals part of a very complicated phenomenon, is valuable in itself, but taken in connection with the fact that the eclipse prominences and the parts of the prominences not seen by the ordinary method are probably downrushes, wholly or partially, it is difficult to overrate its importance. These eclipse prominences, which Prof. Tacchini calls "white" prominences, are high and filamentous, and that distinguished observer, we know, does not hesitate to express his belief that the "comet" seen in the eclipse of 1882 was really one of them. If this be so, then the meteoric downpours of consolidating and consolidated materials are already *en évidence* with a vengeance, and these are the parts of the solar economy we want most to lay hold of just now.

That part of the *Times* Correspondent's letter which refers to the results obtained runs as follows:—

"The Green Island party was the only one doomed to disappointment. At Carriacou, Boulogne, Hog (or Fantôme) Island, and Prickly Point the eclipse was seen and results secured, although at these places even it was touch and go, the sky being cloudy everywhere. Carriacou was most highly favoured. During the totality the sky was cloudless, though the sun was covered one minute after the rim re-appeared. At Fantôme Island the last 40 seconds, and at Prickly Point the first 50 seconds, were lost. At Boulogne the clouds were still more persistent, and cut off 70 seconds of the totality, although Mr. Turner secured some observations during the four minutes before and the five minutes after. The presence of cloud during totality is a more serious matter than it might appear at first sight, for not only is the time reduced during which precious facts may be recorded, but pre-arranged programmes are interfered with, and it may be necessary to change them in order to meet the altered conditions. This requires a rapid and wise decision.

"Before I attempt to give any summary of the general results obtained, it may be remarked that the kinds of work attempted as a rule by eclipse expeditions are four in number, and are very distinct both in their methods and results from each other. We have first of all new facts, or new views of facts, which experience shows us are always obtained at such times, though they are not sought for as such. Next comes the testing of views which have been put forward to explain and harmonise the results previously obtained, and this part of the attack becomes very important when there are rival hypotheses in the field, the superiority of one of which can be established by a few critical observations. The third kind of work is the testing of the new methods of obtaining facts, the introduction of new instruments, or of new or improved ways of using old ones. Only in this way can a complete and perfect system of eclipse observation be built up. Finally we have the application of the ordinary methods of obtaining records, which for the most part are photographic. Astronomers not only want to study the phenomena of each eclipse to get at the physical and chemical structure and nature of the sun's atmosphere, but they want to note the changes from eclipse to eclipse, in order to see which phenomena are liable to variation, and the extent and period of such variation if it exists.

"Now in the eclipse observations secured in Grenada and Carriacou a distinct advance has been made along all the four lines to which reference has been made. New